Page 8, paragraph beginning line 9:

A1

The transfer module 102 includes a stator 110 with two stator parts ~~111, 112~~ and a rotor 114. The rotor has a pair of passages 120, 122. A first passage 120 is an aliquot chamber or passage which initially lies in a first position at 120, in line with the primary stream 24 and the main path 106. As fluid moves along the primary stream 24, such fluid, with analyte in it, fills the aliquot passage 120 while it lies in its first position. The rotor 114 then rotates until the aliquot passage 120 occupies a second position 120x previously occupied by a flowthrough passage 122. A third passage (not shown) in the rotor 114 allows the primary stream 24 to continue to flow while the rotor is in the second position.

Page 8, paragraph beginning line 19:

A2

With the aliquot passage 120 at the second position 120x which was previously occupied by the flowthrough passage 122, a secondary stream 130 flows through the aliquot passage at ~~122~~ 120x. The secondary stream 130 is created by pumping a carrier fluid from the source 132 through the pump 134, and through the carrier fluid tube 136 to the transfer module. The secondary stream 130 flows through the aliquot passage (at the position ~~122~~ 120x) and through the transfer tube 140 along a secondary path 104 to the mass spectrometer 54. In one example, analyte passing along the primary stream 24 will pass through a point such as the column outlet 22, for a period of about 5 to 20 seconds, with the stream 24 moving at a mass rate of 30 mL/min, or 500 μL/sec. In this example, the aliquot passage 120 has a volume of 0.6 μL. As a result, when the aliquot passage 120 is placed in series with the primary stream 24, the aliquot passage will quickly fill with the mobile phase (with an analyte mixed in therewith). After the aliquot passage is filled, the rotor 114 is quickly turned to move the aliquot passage to the position at ~~122~~ 120x.

Page 9, paragraph beginning line 7:

A3

With the aliquot passage at ~~1~~22 and filled with the mobile phase and analyte, the contents of the aliquot passage is ready for movement along the secondary path 104. The secondary stream 130, which flows at a rate of 0.3 mL/min, or 5 μL/sec, will push analyte and mobile phase out of the aliquot passage at 122 toward the spectrometer. As soon as the transfer mobile phase with analyte is flowed out of the aliquot passage at the position ~~120~~ 120x, the rotor is turned back to the original first position where the aliquot passage ~~122~~ 120 is aligned with the primary stream 24, where it will again be filled with a mobile phase (with analyte).

Page 9, paragraph beginning line 22:

A4

The flow of fluid through the aliquot passage 120 (at second position ~~122~~ 120x) and through a tube 140 is essentially laminar. That is, the fluid velocity down the axis of the passage or tube is twice the average velocity, with the fluid velocity at the wall of the tube being zero. The envelope of fluid velocity vectors across the diameter of the tube is the bullet shape that is well known in the field of hydrodynamics. Consequently, the contents of the aliquot passage do not exit into the transfer tube as a well defined plug zone, but rather as a zone that disburses and that continues to disburse as it travels along the transfer tube 140. Thus, the contents of the aliquot passage becomes smeared out along the length of the tube 140. If the aliquot passage is cycled between its two positions with a high enough frequency, the result is a continuous mass flow of analyte into the mass spectrometer.

Page 11, paragraph beginning line 1:

A5

The actuator 141, which is typically a stepping motor, can move the rotor to change the aliquot passage position from 120 to ~~122~~ 120x and vice versa, in less than 0.1 second. Thus, most of the time the aliquot passage lies in one or the other of the two positions. In the above experiments, the position of the rotor was

switched at a frequency of between 2 per second to one per four seconds, with each switching including back and forth movement. As a result of such operation, the concentration of analyte reaching the mass spectrometer at the end of the transfer tube varied about proportionally with the variation in analyte concentration along the primary stream 24. While the prior art can be characterized by the split ratio of the flow rate, the mass rate attenuator of this invention can be characterized by a mass rate ratio. The mass rate ratio is the ratio between the mass transfer rate (which can be expressed in units of μg/sec, where g is grams), along the secondary path 104 that flows to the mass spectrometer, as a fraction of the mass transfer rate in the primary stream 24 that emerges from the column 20. As previously mentioned, the ratio is large if the mass transfer rate entering the mass spectrometer is to be low enough to provide good performance. With a primary stream flow of 500 μL/sec, an aliquot passage volume of 0.6 μL, and a rotor back and forth movement rate of 2 per second, the ratio was 417 to 1. If the cycle frequency is reduced to one per second, than the mass rate ratio drops to 833 to 1. Experimental measurements at all of these cycle frequencies, has demonstrated that the observed mass rate reductions correspond closely to those predicted. In substantially all cases, the aliquot passage is switched at a frequency of between 10 per second and 0.2 per second (once per 5 seconds), to distribute the analyte largely uniformly at the inlet of the mass spectrometer.

a5

Page 13, paragraph beginning line 1:

the aliquot passage 120A, through another lowflow end part or ~~channel 191,~~ and to the highflow second passage 182 and to the main path 106. This flow fills the aliquot passage 120A with a small portion of the primary stream. When the rotor 180 is turned clockwise C by the angle A, the aliquot passage 120A moves to the position ~~122A~~ previously occupied by the flowthrough tube at 122A. Then, the aliquot passage ~~120A~~ is in line with the secondary stream 130. Flow along the secondary stream 130 and through one secondary passage 131, pushes the aliquot

a6

of fluid in the aliquot passage, out through another passage 192 and along the secondary path 104 to the mass spectrometer.

Page 14, paragraph beginning line 15:

Figs. 6-8 show a transfer module 250 that applicant has built and successfully tested, which has additional advantages over the prior art. Fig. 6 shows that the transfer module includes a stator 252 and a shuttle or rotor 254. The stator has a proximal face 256 which is pressed facewise against a proximal face 258 of the rotor. The stator has two primary passages 260, 262 which carry fluid at high flow rates. The primary stream 24 passes into the first primary passage 260, and perhaps 99% or more of it ~~passages~~ passes out through the second primary passage 262 to flow along the main path 106 to a receiver. A pair of secondary passages 270, 272 are provided in the stator, wherein the first one 270 carries the second stream 130 of carrier fluid from a pump. The second secondary passage 272 is connected to the secondary path 104 which leads to the mass spectrometer or other analyzing device.